

In the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) A porous carbon substrate comprising a sheet which includes short carbon fibers dispersed in random directions and a carbonized resin binding the short carbon fibers, wherein ~~in the sheet, the short carbon fibers are bound by the carbonized resin and~~ the sheet has pores and wherein the volume of pores having pore sizes of 10 μm and less among the pores, per unit weight of the sheet, is in the range of 0.05 to 0.16 cc/g.

2. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the thickness of the porous carbon substrate is in the range of 0.10 to 0.25 mm.

3. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the porosity of the porous carbon substrate is in the range of 70 to 90%

4. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the average fiber diameter of the short carbon fibers is in the range of 5 to 20 μm .

5. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, ~~which contains~~ comprising a carbonaceous powder.

6. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the maximum bending load of the porous carbon substrate, measured by a three-point bending test, is in the range of 0.25 to 2.0 N/cm.

7. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the maximum bending load displacement of the porous carbon substrate, measured by a three-point bending test, is in the range of 0.7 to 2.3 mm.

8. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the bending modulus of elasticity of the porous carbon substrate, measured by a three-point bending test, is in the range of 1 to 15 GPa.

9. (Currently Amended) A porous carbon substrate[[,]] according to claim 5, wherein the particle diameter of the carbonaceous powder is in the range of 0.01 to 10 μm .

10. (Currently Amended) A porous carbon substrate[[,]] according to claim 5, wherein the carbonaceous powder is a powder of graphite or carbon black.

11. (Currently Amended) A porous carbon substrate[[,]] according to claim 5, wherein the amount of the carbonaceous powder is in the range of 1 to 60 wt%.

12. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the average fiber length of the short carbon fibers is in the range of 3 to 20 mm.

13. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the density of the porous carbon substrate is in the range of 0.3 to 0.7 g/cm³.

14. (Currently Amended) A porous carbon substrate[[,]] according to claim 1, wherein the peak pore size of the pores in the porous carbon substrate is in the range of 25 to 55 μm.

15. (Currently Amended) A gas diffusion material comprising the porous carbon substrate as set forth in ~~any one of claims 1 through 14~~ claim 1, 2, 3, 4, 9 or 10 and a water repellent material added to the substrate.

16. (Currently Amended) A gas diffusion material comprising a conductive gas diffusion layer formed at least on one side of the porous carbon substrate as set forth in ~~any one of claims 1 through 14~~ claim 1, 2, 3, 4, 9 or 10.

17. (Original) A gas diffusion material comprising a conductive gas diffusion layer formed at least on one side of the gas diffusion material as set forth in claim 15.

18. (Currently Amended) A membrane-electrode assembly comprising a solid polymeric electrolyte membrane, catalyst layers containing catalyst-loaded carbon provided on both the surfaces of the membrane, and gas diffusion materials provided in contact with both the catalyst layers, characterized in that at least one of the gas diffusion materials is the gas diffusion material as set forth in ~~any one of claims 15 through 17~~ claim 15.

19. (Currently Amended) A fuel cell, comprising the membrane-electrode assembly of ~~which is the membrane-electrode assembly~~ as set forth in claim 18.

20. (Currently Amended) A process for producing the porous carbon substrate as set forth in claim 1, comprising:

~~a compression step for treating~~ compressing a fiber sheet precursor comprising short carbon fibers and a resin for compressing it and

~~a carbonization step for treating~~ carbonizing the resin of the compressed fiber sheet precursor so as to produce the porous carbon substrate of claim 1, for carbonizing it,

~~characterized in that wherein,~~ in the compression step, the fiber sheet precursor is intermittently carried and passed between hot plates positioned in parallel to each other, and heated and pressed by the hot plates while they are stopped, then being carried again after completion of heating and pressing, ~~to repeat the carrying and stopping~~ being repeated alternately.

21. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, wherein the fiber sheet precursor ~~contains~~ comprises a carbonaceous powder.

22. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, wherein the resin is a thermosetting resin.

23. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, wherein the fiber sheet precursor contains a carbonaceous powder and the resin is a thermosetting resin.

24. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 22, further comprising ~~wherein a post-curing step for~~ post-curing the thermosetting resin ~~is provided~~ between the compression step and the carbonization step.

25. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 23, further comprising ~~wherein a post-curing step for~~ post-curing the thermosetting resin ~~is provided~~ between the compression step and the carbonization step.

26-31. (Canceled)

32. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, wherein [[the]] a value of LF/LP is from 0.1 to 0.98, where LP is the effective pressing length of the hot plates in the carrying direction and LF is the feed distance of the fiber sheet precursor when the precursor is carried intermittently.

33. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, wherein the temperature of the hot plates is from 140 to 300°C and the pressing pressure of the hot plates is from 0.1 to 40 MPa.

34. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, ~~26 or 29~~, wherein the fiber sheet precursor is a paper ~~in which the~~ comprising short carbon fibers [[are]] bound by a binder.

35. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 23, wherein the amount of the thermosetting resin is from 20 to 300 parts by weight while the amount of the carbonaceous powder is from 1 to 200 parts by weight per 100 parts by weight of the short carbon fibers of the fiber sheet precursor.

36. (Canceled)

37. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 35 ~~or 36~~, wherein the fiber sheet precursor is heated at a heating rate of 10 to 1,000°C/min up to at least a temperature of 1,200°C, for carbonizing the thermosetting resin.

38. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 21[[,]] or 23 ~~or 26~~, wherein the particle diameter of the carbonaceous powder is from 0.01 to 10 µm.

39. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 21[[,]] or 23 ~~or 26~~, wherein the carbonaceous powder is a powder of graphite or carbon black.

40. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, ~~26 or 29~~, wherein the average fiber diameter of the short carbon fibers is from 5 to 20 µm.

41. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, ~~26 or 29~~, wherein the average fiber length of the short carbon fibers is from 3 to 20 mm.

42. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 22[[,]] or 23, ~~27 or 29~~, wherein the thermosetting resin is a phenol resin.

43. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 42, wherein the phenol resin is a phenol resin synthesized without using a metal catalyst or an alkali catalyst.

44. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 22[[,]] or 23, ~~27 or 29~~, wherein the curing degree of the thermosetting resin is 70% or more.

45. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 24[[,]] or 25, ~~28 or 30~~, wherein the heating temperature of the fiber sheet precursor in the post-curing step is from 140 to 300°C.

46. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 25, wherein the fiber sheet precursor has the thermosetting resin carbonized by heating at a heating rate of 500 to 10,000°C/min up to at least 1,200°C.

47. (Canceled)

48. (Currently Amended) A process for producing a porous carbon substrate[[,]] according to claim 20, ~~26 or 29~~, wherein the highest temperature of the heating temperature in the carbonization step is from 1,200 to 2,500°C.